

CLAIMS

What is claimed is:

1. An observation device having an ocular lens and an objective lens and adapted to observe through said ocular lens an intermediate image of an object formed by said objective lens, said observation device comprising:
 - a display section that is provided either on a light path connecting said ocular lens and said objective lens or on a light path branched off from the light path and displays an image; and
 - a light path switching section that is provided on the light path connecting said ocular lens and said objective lens and switches light to be guided from said ocular lens to said objective lens and the image displayed on said display section to be guided to said ocular lens or said objective lens.
2. An observation device having an ocular lens and an objective lens and adapted to observe through said ocular lens an intermediate image of an object formed by said objective lens, said observation device comprising:
 - a display section that is provided either on a light path connecting said ocular lens and said objective lens or on a light path branched off from said light path and displays an image; and
 - a light path dividing section that is provided on the light path connecting said ocular lens and said objective lens, and guides light from said ocular lens to said objective lens and guides the image displayed on said display section to said ocular lens or said objective lens.
3. The observation device according to Claim 1, wherein
said light path switching section is provided on the light path connecting said ocular lens and said objective lens at a position between said objective lens and a position where the intermediate image of the object is formed, and switches a light flux guided between said

• objective lens to said ocular lens and a light flux guided between said display section and said objective lens.

4. The observation device according to Claim 2, wherein

5 said light path dividing section is provided on the light path connecting said ocular lens and said objective lens at a position between said objective lens and a position where the intermediate image of said object is formed, and guides a light flux between said objective lens and said ocular lens and guides the light flux between said display section and said objective lens.

5. The observation device according to Claim 1, wherein

10 said light path switching section is provided on the light path connecting said ocular lens and said objective lens at a position between said ocular lens and a position where the intermediate image of said object is formed, and switches a light flux guided between said objective lens and said ocular lens and a light flux guided between said display section and said ocular lens.

15 6. The observation device according to Claim 2, wherein

 said light path dividing section is provided on the light path connecting said ocular lens and said objective lens at a position between said ocular lens and a position where the intermediate image of said object is formed, and guides a light flux between said objective lens and said ocular lens and guides the light flux between said display section and said

20 ocular lens.

7. The observation device according to any one of Claims 1 to 6, further comprising an erecting optical system on the light path connecting said ocular lens and said objective lens.

8. The observation device according to Claim 7, wherein said erecting optical system comprises a prism.

25 9. The observation device according to Claim 8, wherein said light path switching

• section or said light path dividing section is provided between said prism and said objective lens.

10. Binoculars having two observation devices according to any one of Claims 1 to 6, comprising the ocular lenses, the objective lenses, and one of the light path switching sections and the light path dividing sections in a right portion and a left portion, respectively.

5 11. The binoculars according to Claim 10, further comprising a dividing optical system that divides the image displayed on said display section to guide divided images to said objective lenses or said ocular lenses of the right and left portions, respectively.

12. The observation device according to any one of Claims 1 to 6, further comprising a 10 display lens between one of said light path switching section and said light path dividing section and said display section.

13. The observation device according to any one of Claims 1 to 6, wherein
said display section displays an image for relieving eye fatigue, the image including a
picture which is specific in at least one of shape, brightness and color; and
15 said observation device further comprises an image changing section that changes at
least one of a position and a feature of the picture in the image displayed on said display
section.

14. The observation device according to any one of Claims 1 to 4, wherein
a part or a whole of said objective lens is movable in a direction along the light path
20 connecting said ocular lens and said objective lens.

15. The observation device according to any one of Claims 1 to 4, wherein:
said display section displays an image for relieving eye fatigue; and
said observation device further comprises;
a position-changing section that is provided on a light path connecting said
25 objective lens and said display section and changes a position of the intermediate image

- observed by an observer from an objective lens side in at least one of an optical axis direction and a convergent direction of eyes of the observer; and
 - a controlling section that controls said display section, one of said light path switching section and said light path dividing section, and said position-changing section.
- 5 16. The observation device according to Claim 1 or 3, wherein:
- said display section displays an image for relieving eye fatigue; and
 - said observation device further comprises:
 - a position-changing section that is provided on a light path connecting said objective lens and said display section and changes a position of the intermediate image
- 10 observed by an observer from an objective lens side in at least one of an optical axis direction and a convergent direction of eyes of the observer; and
- a setting section that sets one of first, second, and third modes according to operation of the observer, the first mode being a mode in which a light flux is guided between said objective lens and said ocular lens by said light path switching section, the second mode
 - 15 being a mode in which a position of said intermediate image is changed by said position-changing section in at least one of an optical axis direction and a convergent direction of the eyes of the observer while the light flux is guided by said light path switching section between said objective lens and said ocular lens, a third mode being a mode in which the position of said intermediate image is changed by said position-changing section in at
 - 20 least one of an optical axis direction and a convergent direction of the eyes of the observer while the light flux is guided by said light path switching section between said display section and said objective lens; and
 - a controlling section that controls said light path switching section and said position-changing section according to the mode set by said setting section.
- 25 17. The observation device according to Claim 15 or 16, further comprising a

- dual-purpose lens that is provided on the light path connecting said ocular lens and said objective lens and is movable in a direction along the light path, wherein:
 - said position-changing section includes said dual-purpose lens; and
 - said controlling section moves a position of said dual-purpose lens to thereby make
- 5 focal adjustment of said observation device and change a position of the intermediate image observed by said observer from the objective lens side in the optical axis direction of the eyes of the observer.
18. The observation device according to Claim 17, wherein
when changing the position of the intermediate image observed by the observer
10 from the objective lens side, said controlling section moves said dual-purpose lens in a wider range than when making the focal adjustment.
19. The observation device according to any one of Claims 15 to 18, further comprising a moving section that moves said display section in the convergent direction of the eyes of the observer.
- 15 20. The observation device according to Claim 17 or 18, comprising:
a detecting section that detects a position of said dual-purpose lens;
a memory section that stores the position of said dual-purpose lens detected by said detecting section when the focal adjustment is made and the position of said intermediate image is changed; and
20 a receiving section that receives an instruction to read the position of said dual-purpose lens stored in said memory section, wherein
when said receiving section receives the instruction, said controlling section reads the position of said dual-purpose lens from said memory section and moves said dual-purpose lens to the read position.
- 25 21. The observation device according to any one of Claims 1 to 4, further comprising an

- eye pad member near said objective lens.
22. The observation device according to Claim 21, wherein
said eye pad member has a shape to protect from flare.
23. The observation device according to any one of Claim 1, Claim 2, Claim 5, and Claim
5 6, wherein a part or a whole of said ocular lens is movable in a direction along the light path
connecting said ocular lens and said objective lens.
24. The observation device according to any one of Claim 1, Claim 2, Claim 5, and Claim
6, wherein:

said display section displays an image for relieving eye fatigue; and
10 said observation device further comprises:

a position-changing section that is provided on a light path connecting said ocular
lens and said display section and changes a position of the intermediate image observed by
an observer from the ocular lens side in at least one of an optical axis direction and a
convergent direction of the eyes of the observer; and

15 a controlling section that controls said display section, one of said light path
switching section and said light path dividing section, and said position-changing section.
25. The observation device according to Claim 1 or 5, wherein:

said display section displays an image for relieving eye fatigue; and
said observation device further comprises:

20 a position-changing section that is provided on a light path connecting said ocular
lens and said display section and changes a position of the intermediate image observed by
an observer from the ocular lens side in at least one of an optical axis direction and a
convergent direction of the eyes of the observer;

a setting section that sets one of first, second, and third modes according to
25 operation of the observer, a first mode being a mode in which a light flux is guided between

- said objective lens and said ocular lens by said light path switching section, a second mode being a mode in which the position of said intermediate image is changed in at least one of an optical axis direction and a convergent direction of the eyes of the observer by said position-changing section while the light flux is guided between said objective lens and said ocular lens by said light path switching section, and a third mode being a mode in which the position of said intermediate image is changed in at least one of an optical axis direction and a convergent direction of the eyes of said observer by said position-changing section while the light flux is guided between said display section and said ocular lens by said light path switching section; and
- 10 a controlling section that controls said light path switching section and said position-changing section according to the mode set by said setting section.

26. The observation device according to Claim 24 or 25, further comprising:

 a dual-purpose lens that is provided on the light path connecting said ocular lens and said objective lens and is movable in the direction along the light path, wherein

- 15 said position-changing section includes said dual-purpose lens; and
- said controlling section moves a position of said dual-purpose lens to thereby make focal adjustment of said observation device and change the position of intermediate image observed by the observer from the objective lens side in the optical axis direction of the eyes of the observer.

20 27. The observation device according to Claim 26, wherein

 when changing the position of the intermediate image observed by the observer from the ocular lens side, said controlling section moves said dual-purpose lens in a wider range than when making the focal adjustment.

- 25 28. The observation device according to any one of Claims 24 to 27, further comprising a moving section that moves said display section in the convergent direction of the eyes of said

observer.

29. The observation device according to Claim 26 or 27, comprising:

a detecting section that detects a position of said dual-purpose lens;

a memory section that stores a position of said dual-purpose lens detected by said

5 detecting section when the focal adjustment is made and when the position of said intermediate image is changed; and

a receiving section that receives an instruction to read the position of said dual-purpose lens stored in said memory section, wherein

when said receiving section receives the instruction, said controlling section reads

10 the position of said dual-purpose lens from said memory section and moves said dual-purpose lens to the read position.